

Listing of Claims:

1. (Withdrawn) A plasma processing apparatus for supplying radio-frequency power into a process chamber so as to generate plasma, to thereby treat an object to be processed with the plasma;

wherein the process chamber has a top plate which is disposed opposite to the object to be processed, through the medium of a region for generating the plasma; and a radio-frequency antenna is disposed in the inside and outside of the process chamber so that the radio-frequency antenna is wound around the top plate.

2. (Withdrawn) A plasma processing apparatus according to claim 1, wherein at least one metal-based radio-frequency antenna is disposed, in the process chamber, so as to provide a linear and/or curved line.

3. (Withdrawn) A plasma processing apparatus according to claim 1, wherein the radio-frequency antenna disposed in the process chamber is covered with an insulating material so that the radio-frequency antenna does not directly contact the plasma.

4. (Withdrawn) A plasma processing apparatus according to claim 1, wherein the length of the radio-frequency antenna disposed in the process chamber is not smaller than $(n/2-1/4)\lambda_0$ (wherein λ_0 is the wavelength of the radio-frequency power, and n is an integer) and not larger than $(n/2+1/4)\lambda_0$.

5. (Withdrawn) A plasma processing apparatus according to claim 1, wherein the thickness or diameter of the radio-frequency antenna disposed in the process chamber is changed along with the propagation direction of the radio-frequency power.

6. (Withdrawn) A plasma processing apparatus according to claim 1, wherein the radio-frequency antenna is disposed in the process chamber, so that the density of the radio-frequency antenna arrangement is changed with respect to the central portion and peripheral portion of the process chamber, and/or with respect to the height direction of the process chamber.

7. (Withdrawn) A plasma processing apparatus according to claim 3, where an insulating fluid is circulated between the radio-frequency antenna disposed in the process chamber, and the insulating material.

8. (Withdrawn) A plasma processing apparatus according to claim 1, wherein the distance between the top plate and the radio-frequency antenna disposed in the process chamber is variable.

9. (Withdrawn) A plasma processing apparatus according to claim 1, wherein a measuring device is disposed in at least one position of the top plate so as to monitor the state of the generated plasma.

10. (Withdrawn) A plasma processing apparatus according to claim 1, wherein the top plate has a plurality of apertures for passing a gas to be supplied to the process chamber.

11. (Withdrawn) A plasma processing apparatus according to claim 1, wherein a susceptor for supporting the object to be processed is disposed in the process chamber, and a bias is applied to the susceptor.

12. (Withdrawn) A plasma processing apparatus according to claim 1, wherein at least a portion of the ground line in the process chamber has an opening, and the plasma is generated due to the radiation of a microwave electric field from the opening toward the outside of the ground line.

13. (Previously Presented) A plasma processing apparatus for supplying radio-frequency power into a process chamber so as to generate plasma, to thereby treat an object to be processed with the plasma;

wherein the process chamber has a top plate which is disposed opposite to the object to be processed through the medium of a region for generating the plasma; the top plate comprising a metal-based or silicon-based material;

wherein a plurality of metal-based inductively coupled radio-frequency antennas are disposed in the process chamber to provide linear lines, electric current flows in each of the antennas in one direction so that the directions of the respective electric currents in plural antennas are the same, induction electric fields due to the electric currents in the plural antennas are strengthened by each other on a basis of interactions therebetween; and the adjacent antennas are in parallel with each other on the same plane which is parallel to the object to be processed;

wherein the process chamber has a first chamber wall having a plurality of antennas so that the antennas penetrate the first chamber wall into the inside of the process chamber;

wherein the radio-frequency antennas disposed in the process chamber are covered with an insulating material so that the radio-frequency antennas do not directly contact the plasma; and

wherein said radio-frequency power is distributed by a distributor so that the radio-frequency power can be supplied into the process chamber from said plurality of antennas.

14-15. (Canceled)

16. (Previously Presented) A plasma processing apparatus according to claim 13, wherein the length of the radio-frequency antenna disposed in the process chamber is not smaller than $(n/2-1/4)\lambda_0$ (wherein λ_0 is the wavelength of the radio-frequency power, and n is an integer) and not larger than $(n/2+1/4)\lambda_0$.

17. (Previously Presented) A plasma processing apparatus according to claim 13, wherein the thickness or diameter of the radio-frequency antenna disposed in the process chamber is changed along with the propagation direction of the radio-frequency power.

18. (Withdrawn) A plasma processing apparatus according to claim 14, wherein the radio-frequency antenna is disposed, in the process chamber, so that the density of the radio-frequency antenna arrangement is changed with respect to the central portion and peripheral portion of the process chamber, and/or with respect to the height direction of the process chamber.

19. (Previously Presented) A plasma processing apparatus according to claim 13, where an insulating fluid is circulated between the radio-frequency antenna disposed in the process chamber, and the insulating material.

20. (Withdrawn) A plasma processing apparatus according to claim 14, wherein the distance between the top plate and the radio-frequency antenna disposed in the process chamber is variable.

21. (Previously Presented) A plasma processing apparatus according to claim 13, wherein a measuring device is disposed in at least one position of the top plate so as to monitor the state of the generated plasma.

22. (Previously Presented) A plasma processing apparatus according to claim 13, wherein the top plate has a plurality of apertures for passing a gas to be supplied to the process chamber.

23. (Previously Presented) A plasma processing apparatus according to claim 13, wherein a susceptor for supporting the object to be processed is disposed in the process chamber, and a bias is applied to the susceptor.

24. (Withdrawn) A plasma processing apparatus according to claim 14, wherein at least a portion of the ground line in the process chamber has an opening, and the plasma is generated due to the radiation of a microwave electric field from the opening toward the outside of the ground line.

25. (Previously Presented) A plasma processing apparatus according to claim 13, wherein induction electric fields due to respective electric currents in the plurality of antennas are strengthened by each other.

26. (Previously Presented) A plasma processing apparatus according to claim 13, wherein the process chamber has a second chamber wall opposed to the first chamber wall, and each antenna penetrates the first chamber wall and the second chamber wall.